

## ***Passalora golaghati* comb. nov. from India**

GARGEE SINGH<sup>1</sup>, SANJAY YADAV<sup>2</sup>,  
RAGHVENDRA SINGH<sup>2\*</sup>, SHAMBHU KUMAR<sup>3</sup>

<sup>1</sup>Department of Botany, DDU Gorakhpur University,  
Gorakhpur, U.P., India 273009

<sup>2</sup>Centre of Advanced Study in Botany, Institute of Science, Banaras Hindu University,  
Varanasi, U.P., India 221005

<sup>3</sup>Forest Pathology Department, KSCSTE-Kerala Forest Research Institute,  
Peechi, Thrissur, Kerala, India 680653

\* CORRESPONDENCE TO: [drsinghtaxon@gmail.com](mailto:drsinghtaxon@gmail.com), [singhr.bot@bhu.ac.in](mailto:singhr.bot@bhu.ac.in)

**ABSTRACT**—The hyphomycete *Cercospora golaghati* is recombined as *Passalora golaghati* based on critical re-examinations of original type material and a fresh topotypic collection and comparison with closely related species of cercosporoid taxa.

**KEY WORDS**—foliicolous, anamorph, *Mycosphaerellaceae*, nomenclature, taxonomy

## **Introduction**

The significant characteristic that separates the two cercosporoid genera *Cercospora* Fresen. ex Fuckel and *Passalora* Fr. is colouration of conidia. When Crous & Braun (2003) emended the circumscription of *Passalora* based on ITS and 5.8S rDNA sequence analyses, they observed that the formation of single or catenate conidia is not a stable feature for diagnosis at the generic level in cercosporoid hyphomycetes (Crous & al. 2001). Their contributions have confirmed that presence or absence of thickened conidiogenous loci and pigmentation in conidiophores and conidia are important features of taxonomic relevance (Crous & al. 2009, 2013; Videira & al. 2017). During the last decade a large number of cercosporoid fungi have been recombined in the genus *Passalora* (Crous & Braun 2003; Braun

& al. 2013, 2014, 2015a,b, 2016), particularly from India (Kamal 2010). Recently, the addition of several novel taxa of foliicolous cercosporoid fungi described from India (Kumar & Singh 2015a,b, 2016; Awasthi & al. 2016; Singh & al. 2011, 2012, 2013) suggests that cercosporoid diversity is still insufficiently known in this region.

A new collection from the type locality of *Cercospora golaghati* (Saikia & Sarbhoy 1980) confirmed that this species is characterized by thickened scars and coloured conidiophores and conidia, indicating that it should be transferred to *Passalora* (Crous & Braun 2003).

## Materials & methods

The holotype [conserved in the Herbarium, Division of Mycology & Plant Pathology, Indian Agricultural Research Institute, New Delhi, India (HCIO)] and a fresh specimen collected from the same host species in the same locality [conserved in the Mycological Herbarium of the Gorakhpur University, Gorakhpur, UP, India (MH-GPU)] were critically analyzed, and slides from infection spots were mounted in distilled water, lactophenol and cotton-blue mixture. Observation of microscopic characters was recorded under an Olympus CH20i-TR compound microscope to understand the exact morphology of the fungus. Measurements of 30 conidia, hila, conidiophores, and conidiogenous cells were recorded with the help of stage and ocular micrometers, and Lucida drawings were also made. The morphology of the fungus was compared with closely related cercosporoid taxa with the help of current literature.

## Taxonomy

*Passalora golaghati* (Saikia & A.K. Sarbhoy) Gargee Singh, Sanj. Yadav,

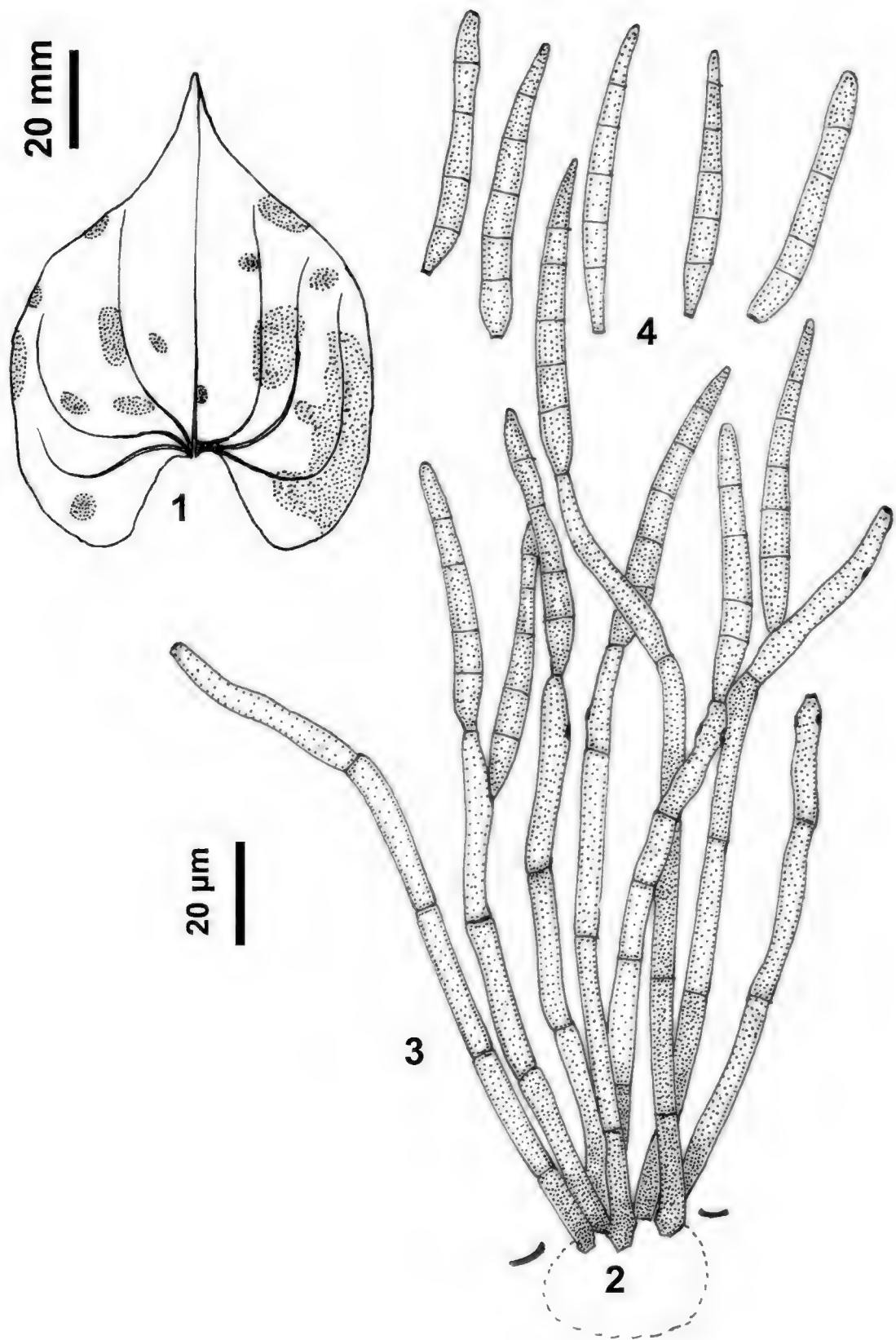
Raghv. Singh & Sh. Kumar, **comb. nov.**

FIGS 1–4

MB 835579

≡ *Cercospora golaghati* Saikia & A.K. Sarbhoy, Curr. Sci. 49: 830. 1980, as “*golaghatii*”.

INFECTION SPOTS amphigenous, brown to dark blackish brown, initially circular to subcircular, later spreading over the leaf surface to become irregular, 3–15 mm in diam. COLONIES hypophyllous and effuse. MYCELIUM internal. STROMATA present, epidermal to subepidermal, pseudoparenchymatous, brown to dark brown, 30–32 × 18–19 µm in diam. CONIDIOPHORES fasciculate, macronematous, brown to dark brown, unbranched, cylindrical, erect to procumbent, straight to flexuous, geniculate, smooth, thick-walled, 2–7-septate, (62–)80–102(–152) × 3–5 µm. CONIDIOGENOUS CELLS polyblastic, integrated, terminal, apex often slightly wider than at the base, 20–40 × 3–5 µm, loci thickened and darkened, 2–2.5 µm. CONIDIA solitary, acropleurogenous, obclavate-cylindrical, simple, dry, straight to slightly



FIGS 1–4. *Passalora golaghati* (holotype, HCIO 32660).  
1. Symptoms of infection; 2. Stroma; 3. Conidiophores; 4. Conidia.

curved, thin-walled, smooth, brown to mid brown, 3–6-septate, tip acute to sub-obtuse, base obconico-truncate, (35–)50–60(–75) × 2.5–6 µm, hilum protuberant, thickened and darkened, 2–2.5 µm.

SPECIMENS EXAMINED: INDIA, ASSAM, Golaghat, Salikihat, on living leaves of *Dioscorea alata* L. (*Dioscoreaceae*), 21 November 1977, leg. U.N. Saikia (HCIO 32660, holotype); 26.5239°N 93.9623°E, on living leaves of *Dioscorea alata*, December 2019, leg. Gargee Singh (MH-GPU 1, topotype).

Discussion

A literature review revealed that seven *Passalora* taxa have been reported on *Dioscoreaceae*: *P. dioscoreae* (Ellis & G. Martin) U. Braun & Crous, *P. dioscoreae-nipponicae* Y.L. Guo, *P. dioscoreae-subcalvae* Y.L. Guo, *P. dioscoreicola* Y.L. Guo, *P. dioscoreigena* U. Braun & Crous, *P. tranzschelii* (Vassiljevsky) U. Braun & Crous var. *tranzschelii*, and *P. tranzschelii* var. *chinensis* Y.L. Guo (Braun & al. 2014, Crous & Braun 2003; Guo 2001, 2011). *Passalora dioscoreae* has been subsequently recombined in *Distocercosporaster* by Videira & al. (2017). *Passalora golaghati* differs distinctly from all the remaining *Passalora* species in its conidiophore and conidial sizes. Morphological comparisons of all *Passalora* species reported on *Dioscoreaceae* are presented in TABLE 1.

Key to *Passalora* spp. reported on *Dioscoreaceae*

- 1. Conidial length ≤75 µm ..... 2
- 1. Conidial length >75 µm ..... 3
- 2. Conidiophores 35–175 × 4–6 µm, conidia 10–55 × 7.5–10 µm,  
1–2-septate ..... *P. dioscoreicola*
- 2. Conidiophores 80–102 × 3–5 µm, conidia 50–60 × 2.5–6 µm,  
3–6-septate ..... *P. golaghati*
- 3. Conidiophore length ≤50 µm ..... 4
- 3. Conidiophore length >50 µm ..... 5
- 4. Conidiogenous loci 1–2 µm diam., conidia 15–90 × 2–5 µm,  
0–3-septate ..... *P. tranzschelii* var. *tranzschelii*
- 4. Conidiogenous loci 1.5–3 µm diam., conidia 30–125 × 4–7 µm,  
3–10-septate ..... *P. tranzschelii* var. *chinensis*
- 5. Conidiophore length <100 µm ..... 6
- 5. Conidiophore length >100 µm ..... *P. dioscoreigena*
- 6. Conidiophores 10–70 × 4–7 µm, conidia 30–125 × 4–6.5 µm,  
3–10-septate. .... *P. dioscoreae-nipponicae*
- 6. Conidiophores 25–65 × 4.5–6.5 µm, conidia 30–85 × 4.5–6.5 µm,  
2–6-septate. .... *P. dioscoreae-subcalvae*

TABLE 1. Comparative morphology of *Passalora* taxa reported on *Dioscoreaceae*.

| TAXON                                           | CONIDIOPHORE SIZE (µm) | CONIDIA   |                  |
|-------------------------------------------------|------------------------|-----------|------------------|
|                                                 |                        | SEPTATION | SIZE (µm)        |
| <i>P. dioscoreae-nipponicae</i>                 | 10–70 × 4–7            | 3–10      | 30–125 × 4–6.5   |
| <i>P. dioscoreae-subcalvae</i>                  | 25–65 × 4.5–6.5        | 2–6       | 30–85 × 4.5–6.5  |
| <i>P. dioscoreicola</i>                         | 35–175 × 4–6           | 1–2       | 10–55 × 7.5–10   |
| <i>P. dioscoreigena</i>                         | 40–120 × 5–8.5         | 1–6       | 25–110 × 4.5–6.5 |
| <i>P. golaghati</i>                             | 80–102 × 3–5           | 3–6       | 50–60 × 2.5–6    |
| <i>P. tranzschelii</i> var. <i>tranzschelii</i> | 5–50 × 3–7             | 0–3       | 15–90 × 2–5      |
| <i>P. tranzschelii</i> var. <i>chinensis</i>    | 5–50 × 3–7             | 3–10      | 30–125 × 4–7     |

Acknowledgments

Sincere thanks are due to Curator of the HCIO (New Delhi) for making it possible to examine the holotype collection of *Cercospora golaghati*. We express our deep gratitude to Dr. R.F. Castañeda-Ruiz (INIFAT Alejandro de Humboldt, Habana, Cuba) and Dr. Flavia Rodrigues Barbosa (Universidade Federal de Mato Grosso, Brazil) for presubmission critical review. We express our deep appreciation to Prof. Dr. Kamal (Emeritus Scientist, DST) for his valuable suggestions and kind help. We are also thankful to the Head of the Department of Botany of D.D.U. Gorakhpur University, Gorakhpur, U.P., for providing necessary facilities.

Literature cited

Awasthi N, Singh R, Kumar S. 2016. A new species of *Pseudocercospora* on *Andrographis paniculata* from Central India. *Sydowia* 68: 27–33.

Braun U, Nakashima C, Crous PW 2013. Cercosporoid fungi (*Mycosphaerellaceae*) 1. Species on other fungi, *Pteridophyta* and *Gymnospermae*. *IMA Fungus* 4: 265–345. <https://doi.org/10.5598/imafungus.2013.04.02.12>

Braun U, Crous PW, Nakashima C. 2014. Cercosporoid fungi (*Mycosphaerellaceae*) 2. Species on monocots (*Acoraceae* to *Xyridaceae*, excluding *Poaceae*). *IMA Fungus* 5: 203–390. <https://doi.org/10.5598/imafungus.2014.05.02.04>

Braun U, Crous PW, Nakashima C. 2015a. Cercosporoid fungi (*Mycosphaerellaceae*) 3. Species on monocots (*Poaceae*, true grasses). *IMA Fungus* 6: 25–97. <https://doi.org/10.5598/imafungus.2015.06.01.03>

Braun U, Crous PW, Nakashima C. 2015b. Cercosporoid fungi (*Mycosphaerellaceae*) 4. Species on dicots (*Acanthaceae* to *Amaranthaceae*). *IMA Fungus* 6: 373–469. <https://doi.org/10.5598/imafungus.2015.06.02.09>

Braun U, Crous PW, Nakashima C. 2016. Cercosporoid fungi (*Mycosphaerellaceae*) 5. Species on dicots (*Anacardiaceae* to *Annonaceae*). *IMA Fungus* 7: 161–216. <https://doi.org/10.5598/imafungus.2016.07.01.10>

Crous PW, Braun U. 2003. *Mycosphaerella* and its anamorphs: names published in *Cercospora* and *Passalora*. CBS Biodiversity Series 1. CBS Utrecht, The Netherlands. 571 p.

- Crous PW, Kang JC, Braun U. 2001. A phylogenetic redefinition of anamorph genera in *Mycosphaerella* based on ITS rDNA sequence and morphology. *Mycologia* 93: 1081–1101. <https://doi.org/10.1080/00275514.2001.12063243>
- Crous PW, Summerell BA, Carnegie AJ, Wingfield MJ, Hunter GC, Burgess TI, Andjic V, Barber PA, Groenewald JZ. 2009. Unravelling *Mycosphaerella*: do you believe in genera? *Persoonia* 23: 99–118. <https://doi.org/10.3767/003158509X479487>
- Crous PW, Braun U, Hunter GC, Wingfield MJ, Verkley GJM, Shin HD, Nakashima C, Groenewald JZ. 2013. Phylogenetic lineages in *Pseudocercospora*. *Studies in Mycology* 75: 37–114. <https://doi.org/10.3114/sim0005>
- Guo YL. 2001. Studies on *Cercospora* and allied genera in China IX. *Mycosystema* 20(3): 301–303.
- Guo YL. 2011. Studies on *Cercospora* and allied genera of China XIV. *Mycosystema* 30(6): 865–869.
- Kamal. 2010. Cercosporoid fungi of India. Bishan Singh Mahendra Pal Singh Publication, Dehradun (UK), India. 351 p.
- Kumar S, Singh R. 2015a. *Passalora musicola* sp. nov. a new Indian hyphomycete. *Sydowia* 67: 21–23.
- Kumar S, Singh R. 2015b. *Pseudocercospora bischofigena*, a new Cercosporoid fungus from northeastern Uttar Pradesh, India. *Czech Mycology* 67: 39–44. <https://doi.org/10.33585/cmy.67105>
- Kumar S, Singh R. 2016. *Passalora caesalpiniiicola* sp. nov. from India on *Caesalpinia bonduc*. *Mycotaxon* 131: 25–30. <https://doi.org/10.5248/131.25>
- Saikia UN, Sarbhoy AK. 1980. A new species of *Cercospora* from India. *Current Science* 49: 830–831.
- Singh R, Kumar S, Kamal. 2011. Two new species of *Passalora* and *Pseudocercospora* from northeastern Uttar Pradesh, India. *Mycotaxon* 117: 137–143. <https://doi.org/10.5248/117.137>
- Singh R, Chaurasia B, Shukla K, Upadhyaya PP. 2012. *Passalora aseptata*, a new Cercosporoid fungus from northeastern Uttar Pradesh, India. *Mycotaxon* 120: 461–463. <https://doi.org/10.5248/120.461>
- Singh R, Kumar S, Saini DC, Upadhyaya PP, Kamal, Braun U. 2013. Diversity of *Passalora* on *Ficus*. *Mycological Progress* 12: 637–643. <https://doi.org/10.1007/s11557-012-0870-6>
- Videira SIR, Groenewald JZ, Nakashima C, Braun U, Barreto RW, de Wit, PJGM, Crous PW. 2017. *Mycosphaerellaceae* – chaos or clarity? *Studies in Mycology* 87: 257–421. <https://doi.org/10.1016/j.simyco.2017.09.003>